

INTER AND INTRAORGANIZATIONAL COHESION IN EMERGENCIES*

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The purpose of this paper is to pose and test a means to facilitate the comparative examination of interorganizational relations and behavior in emergency planning and response. Additionally we sought to define and operationalize the concept of inter- and intraorganizational cohesion in emergencies. The paper, following a review of literature on organizational behavior in disasters, describes an effort to define, and develop measures for twenty indicators of inter- and intraorganizational cohesion. Data on these indicators are collected for organizations in an emergency response network at a nuclear power plant. This is done for relationships in both pre-emergency planning and for an exercise of an emergency plan. Findings regarding cohesion are presented and the implications for refining emergency organizational theory are discussed. Overall it was found that internally organizations are fairly cohesive but that cohesiveness diminishes between organizations. Communications and lack of interaction clarity appear to be the chief reasons for decreases in cohesion. In order to understand why this occurs, it is necessary to investigate the antecedents of organizational behavior that lead to cohesion breakdowns.

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It is widely accepted that the type and character of emergency planning within and between organizations has an effect on the way in which those organizations perform in an actual emergency (cf. Drabek et al., 1981; Mileti et al., 1975; Quarantelli and Kreps, 1972; Dynes, 1970; and many others). Indeed, an elaborate body of research literature exists on organizational behavior and interorganizational relations; and summaries of the literature about the response of organizations to a variety of disasters are attempted periodically (Mileti, 1980; Quarantelli and Dynes, 1977; Mileti et al., 1975; Barton, 1970; Dynes, 1970; Fritz, 1961, 1968). A recurrent and encouraging conclusion of organizational scholars is that the factors that influence and the processes that guide organizational response to disasters are not unique; on both theoretical and applied grounds, organizational behavior and relations to disaster reflect the findings of organizational research in general (Mileti, 1982). Interestingly, however, while the behavior of organizations in general and organizational behavior in emergencies in particular have both been the topic of considerable research, the behavior of organizations with emergency responsibilities while in the emergency planning mode has not as yet been investigated in a systematic way. Further, the relationship between organizational relations in the planning mode and interactions between organizations in an actual emergency is not well documented. It is the purpose of this paper to propose and test a means to facilitate the comparative examination of interorganizational relations and behavior in both emergency planning and response modes.

Dynamics of Organizational Interactions

Research into why organizations are effective or not in response to disasters, as well as why coordination within and between organizations in emergencies does and does not occur can readily be grouped into a four-class typology. One dimension of this typology is organizationally focused and is well defined by an

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intra- versus inter-organizational dichotomy. Employing the commonly used model of disaster time-phases--mitigation, preparedness, response and recovery, we have divided the second dimension of the typology into the pre-disaster preparedness period versus the disaster response period (Barton, 1969; National Governors Association, 1979). These middle two phases concern the behavior of organizations in emergency action modes. The four-class typology which results from the juxtaposition of these two dimensions serves as a means to help organize the research literature review which follows.

Organizational Effectiveness in Pre-Disaster Preparedness Response Period

Studies that have examined the behavior of organizations during the pre-disaster preparedness period are scant when compared to other types of organizational disaster studies. Some dozen or so studies, however, do exist and these have revealed that several factors do seem to have an effect on the effectiveness of organizations during disaster warnings. A general conclusion of these studies is that disaster experiences enhances the ability of an organization to participate in the warning process, as well as respond to warnings (Mileti et al., 1975; Barton, 1970; Dynes, 1970; McLuckie, 1970; Anderson, 1969a; Moore, 1956; Eliot, 1932). The general capacity of an organization for communication (Leik et al., 1981; Mileti et al., 1975; Kennedy, 1970) has also been pointed out as central to organizational effectiveness. A third factor which has been documented as important for organizational warning effectiveness is the perceived probability of the disaster by organizational members (Anderson, 1969a; Fritz, 1961; Fritz and Williams, 1957; Spiegel, 1957; Instituut Vor Sociaal Onderzoek Van Het Nederlandse Volk Amsterdam, 1955). Organizations are quite reluctant to participate in warning dissemination if organizational officials are not reasonably confident that a disaster will in fact materialize. Fear of negative public reactions for issuing a false alarm is likely a main reason (Moore et al., 1963; Anderson, 1969; Mileti et al., 1975). The fourth factor research has shown to be linked with the effectiveness of organizations during warnings is the structure of the organization itself. Factors of structure shown to have an influence on the ability of an organization to mobilize in the pre-impact situation are varied. Mobilization is typically quicker and less problematic for organizations who have normal duties that resemble their disaster-tied roles (Adams, 1971), a dispersed rather than centralized and formalized decision making structure (McLuckie, 1970; Instituut Vor Sociaal Onderzoek Van Het Nederlandse Volk

Amsterdam, 1955), and little role conflict for organizational members (Thompson and Hawkes, 1962).

Organizational Effectiveness in Disaster Impact Response

Despite a variety of difficulties in defining and measuring organizational effectiveness (Scott, 1981), a large number of studies have been performed which provide a relatively sound basis for concluding what are some of the determinants of the effectiveness of organizations, as individual entities, in disaster response. The findings of these studies, when brought together, point out that seven key ingredients appear necessary for an effective response. The first of these may well be labelled normativeness. That is, it has been found (Adams, 1970b; Anderson, 1969; Dynes, Haas, and Quarantelli, 1967) that the less an organization has to change its pre-disaster functions and roles to perform in a disaster, the more effective is its disaster response. In essence, organizations whose daily operations can be switched to the topic of the emergency at hand, as a rule, do better than organizations who must adopt new operations that are unique to the emergency and their response to it.

Second, and closely linked to the notion of normativeness, is the ability of an organization to be flexible. Organizational structures which are better able to vary from standard operating procedures during the disaster are typically more effective than those which cannot be flexible (Drabek et al., 1981; Kreps, 1978; Stallings, 1978; Weller, 1972; Brouillette and Quarantelli, 1971; Haas and Drabek, 1970; Drabek and Haas, 1969a, 1969b; Dynes and Warheit, 1969; Warheit, 1968, 1969; Dynes, 1966; Moore, 1966; Barton, 1962; Form and Nosow, 1958). An organization which is rigid in structure, in general, has a difficult time dealing with the uncertainty of disaster (Dynes, 1969) and adapting to its needs. The result is that disaster response effectiveness suffers.

A third major factor affecting the ability of an organization to be effective in disaster emergencies is work definition. Evidence exists on which to conclude that organizations with members who know what to do, how to prioritize work and how to administer the activities are more effective. The issue of work definition is particularly important in organizations for whom emergency work is not a daily routine. In this case, definition of disaster or emergency roles as part of emergency operations is essential (Haas and Drabek, 1973; Adams, 1970b; Kennedy, 1970; Dynes, 1969; Thompson, 1967; Barton 1962; Form and Nosow, 1958). Organizational actors must be able

to see emergency response as their job, and have clearly defined roles to play. In addition, the clear definition of the internal authority structure of an organization must be spelled out (Dynes, 1969; Form and Nosow, 1958). This need is particularly acute since authority in organizations during emergencies typically shifts from what it is during routine operations.

To complement authority, the work domains of territory of each organization, as distinct from other organizations, should be clearly defined (Dynes, Quarantelli and Kreps, 1972). Fourth, adequate resources are necessary for effective response (Kreps, 1978; Dynes, Quarantelli and Kreps, 1972). It has also been suggested (Form and Nosow, 1958) that interorganizational resource dependence helps ensure an adequate supply of resources. A fifth important ingredient for effectiveness is information and communication ability (Quarantelli, 1970a). Organizations who are able to effectively get and share information with others typically enhance effectiveness (Dynes, 1969). Sixth, organizational legitimation, or the claim to be able to do their emergency-tied work with approval and recognition from either organizations and recognition from either organizations and in doing it is related to effective response.

Finally, internal organization cohesion between members is an impetus for organizational effectiveness. Commitment (Dynes, 1970b; Quarantelli and Dynes, 1977), group cohesion (Form and Nosow, 1958), and a lack of role conflict (Dynes, 1969; Barton, 1962; Thompson and Hawkes, 1962; Form and Nosow, 1958) typically all signify that organizational workers are ready to get the job done.

Interorganizational Coordination and Effectiveness in the Pre-Disaster Preparedness Period

Little systematic research has been performed on this topic beyond a few studies (cf. Leik et al., 1981; Mileti et al., 1975; McLuckie, 1970; Anderson, 1969a). The result of these efforts indicate that the interorganizational elements essential for effective interorganizational warning-tied interaction and communication are definition of an organizational role in warning (cf. Mileti et al., 1975; Kennedy, 1970), and pre-emergency patterns of interorganizational communication on which to build during the emergency (cf. Barton, 1970; Dynes, 1970). Put simply, for warnings and information flow between organizations to be effective, organizations must define dissemination as part of their job and the communication will still favor familiar lines. In addition, effectiveness is enhanced if information is clear, unambiguous, and communicated in a speedy fashion (Anderson, 1969a).

Interorganizational Coordination and Effectiveness In Disaster Impact Response

A rich research history has explored the nature and character of interorganizational relations in emergencies in an effort to trace through its impact on emergency response effectiveness. An overriding conclusion of this research is that interorganizational coordination enhances the effectiveness of the overall response to the emergency. Many concepts have been shown by this research to form a basis for the effectiveness of overall response. When the different approaches of researchers to the topic are taken into consideration, the array of concepts, however, fits well into four general categories: (1) domain consensus and role specification, (2) network definition and integration, (3) communication and (4) autonomy maintenance.

Domain consensus and role specification refers to the degree to which each organization knows what it and other organizations are to do during the emergency (Dynes, 1978; Kreps, 1978; Dynes, Quarantelli and Kreps, 1972). Put simply, the effectiveness of overall response to an emergency escalates if members of all responding organizations know who is to do what and those boundaries are well understood. Knowing is not enough to insure effective response. In addition, it is facilitated by organizations viewing each other's job as being important or legitimate (Dynes, 1969, 1978; Stallings, 1978; Warheit, 1970). This helps facilitate clear lines of authority between organizations (Drabek et al., 1981; Thompson and Hawkes, 1962; Rosow, 1955). Clear lines of authority between organizations can help to avoid conflict and enables conflicts to be resolved when they do occur, although not as well as does a predetermined mechanism for settling disputes.

Integration across organizations is a second important factor and is easier to achieve if participating organizations interact normatively during non-emergency periods (Drabek et al., 1981; Dynes, 1978; Brouillette, 1971; Form and Nosow, 1958; Clifford, 1956). Organizations with members who are used to interacting with each other are easier to coordinate for interaction in an emergency. Coordination and integration across organizations in emergencies also escalates as a function of organizations having overlapping members, or the same people being on boards, panels, committees and the like across organizations (Dynes, 1969). The notion of inter-locking membership suggests that interaction, communication and coordination are facilitated if people have overlapping organizational roles. In this same vein, the existence of boundary personnel, people who are charged with interorganizational communications usually guarantees that interaction occurs (Dynes, 1978, 1969). Interaction escalates

coordination, and coordination enhances effectiveness (Drabek et al., 1981; Dynes, Quarantelli and Kreps, 1972; Dynes, 1970b; Warheit, 1970; Barton, 1969; Parr, 1969b; Drabek, 1968; Fritz and Marks, 1954; Kutak, 1938).

An additional factor that has been shown to facilitate network integration and coordination is knowledge about other organizations (Dynes, 1978). If members of organizations understand the internal operations and structure of other organizations, it is easier to coordinate and communicate with those other organizations. The general idea of network definition and integration for interorganizational coordination, although comprised of several concepts, is straightforward. Interorganizational coordination increases as a result of work to integrate the organizations participating in the interorganizational emergency response. A key device for enhancing integration is the construction of resource linkages across organizations (Drabek et al., 1981; Dynes, 1978, 1970b; Kreps, 1978; Stallings, 1978; Quarantelli and Dynes, 1972; Warheit, 1968; Demerath and Wallace, 1957). Resource sharing and interdependence across organizations sometimes fosters other avenues for interorganizational linkages. The major conclusion of this research suggests that coordination and effectiveness of interorganizational emergency response increases as a result of prior efforts to cast participating organizations into an integrated response network.

Third, communication between members of different organizations is another essential ingredient for an interorganizational emergency response system to be coordinated and for heightened effectiveness (Drabek et al., 1981; Dynes, 1978; Brouillette, 1971; Quarantelli, 1970a; Dacy and Kunreuther, 1969). Efficient interorganizational communication is essential for the provision of information between organizations regarding their specialized roles and task, and for the quick dissemination of news about the changing context of the emergency.

Finally, autonomy maintenance (Mileti et al., 1975; Dynes, 1970; Dynes and Warheit, 1969; Parr, 1969b; Warheit, 1968; Quarantelli and Dynes, 1967; Thompson and Hawkes, 1962) or the struggle on the part of individual organizations to resist giving up autonomy, is a major constraint to effectiveness. A requisite for an effective response to an emergency is that participating organizations be convinced that inconsequential losses of autonomy are in the overall interest of an effective response.

Determinants of Effective Organizational Disaster Response: A Summary and Overview

The behavior of organizational actors is a critical component of emergency planning and response. Moreover, factors important to casting the effectiveness of that response are not only limited to organizational ones, but also extend to those which profile the type and intensity of interorganizational relations that go on between organizational factors. Table 1 presents a summary of factors important for emergency response coordination and organizational and interorganizational system effectiveness derived from the literature review. Three key principles critical to a cohesive and effective emergency response emerge from this table. First, organizations must know what they are supposed to do and who is to do it. Second, organizations must be integrated with other organizations. Third, they must maintain flexibility.

Table 1: An Overview of Determinants of Effective Organizational Response in Emergencies and Disasters.

Time Period	Intraorganizational Factors	Interorganizational Factors
Pre-disaster Preparedness Period	<ul style="list-style-type: none"> * Disaster experience * Communications * Perceived probability of disaster * Organizational structure <ul style="list-style-type: none"> - flexible decision making - role conflict (territory) 	<ul style="list-style-type: none"> * Role definition * Communication
Disaster Response Period	<ul style="list-style-type: none"> * Normativeness * Flexibility * Work definition <ul style="list-style-type: none"> - role definition - priority setting - authority - knowledge * Resources * Information and communications * Legitimacy * Cohesion 	<ul style="list-style-type: none"> * Domain consensus (boundaries) * Legitimacy * Dispute resolution * Authority * Interaction * Flexibility * Knowledge * Resource linkages * Communication * Autonomy

Each specific factor catalogued in Table 1 seems subsumed by one more of these general principles.

A general framework emerges to explain, therefore, the comprehensiveness and effectiveness of the network of organizations that respond to emergencies and disasters. It is presented in Figure 1. The key element in the framework presented is the process whereby interaction takes place. As depicted in the middle box, planning and response is characterized by: (1) intraorganizational relationships, that is, the set of interactions that take place among members of an organization; (2) interorganizational relationships; that is, the set of interactions between organizations and their members; (3) intraorganizational flexibility, or, the ability of individual organizations to change in response to new environments or circumstances; (4) interorganizational flexibility, or, the ability of organizations to change relationships with other organizations; and (5) response networks, or, the pattern of interactions among all organizations in the response effort.

The nature of the inter- and intraorganizations, flexibility, and response network integration is determined to a large extent by the characteristics of each organization and by the planning efforts which take place before or between emergencies. In turn, the organizational process has a direct effect on response comprehensiveness and cohesiveness. In this model, comprehensiveness and cohesiveness are indicators of effective interaction. Comprehensiveness is largely an "objective" indicator and is largely determined by whether all functional emergency response tasks are considered in planning and implemented in an emergency. Cohesion, however, is largely subjective. In the next section, we explore in greater depth the relationship between effectiveness and cohesiveness and define factors which denote the presence and absence of cohesion in organizations.

Methods and Data

Sample

Data for the study were collected from all organizations with a primary functional response task leadership role at a nuclear power plant. These roles were ascertained by reviewing emergency plans for the site chosen. The reactor chosen for study was based upon discussion with officials of the Federal Emergency Management Agency (FEMA). The criteria were that the utility and offsite response organizations were neither the best or the worst in previous graded exercises and had an

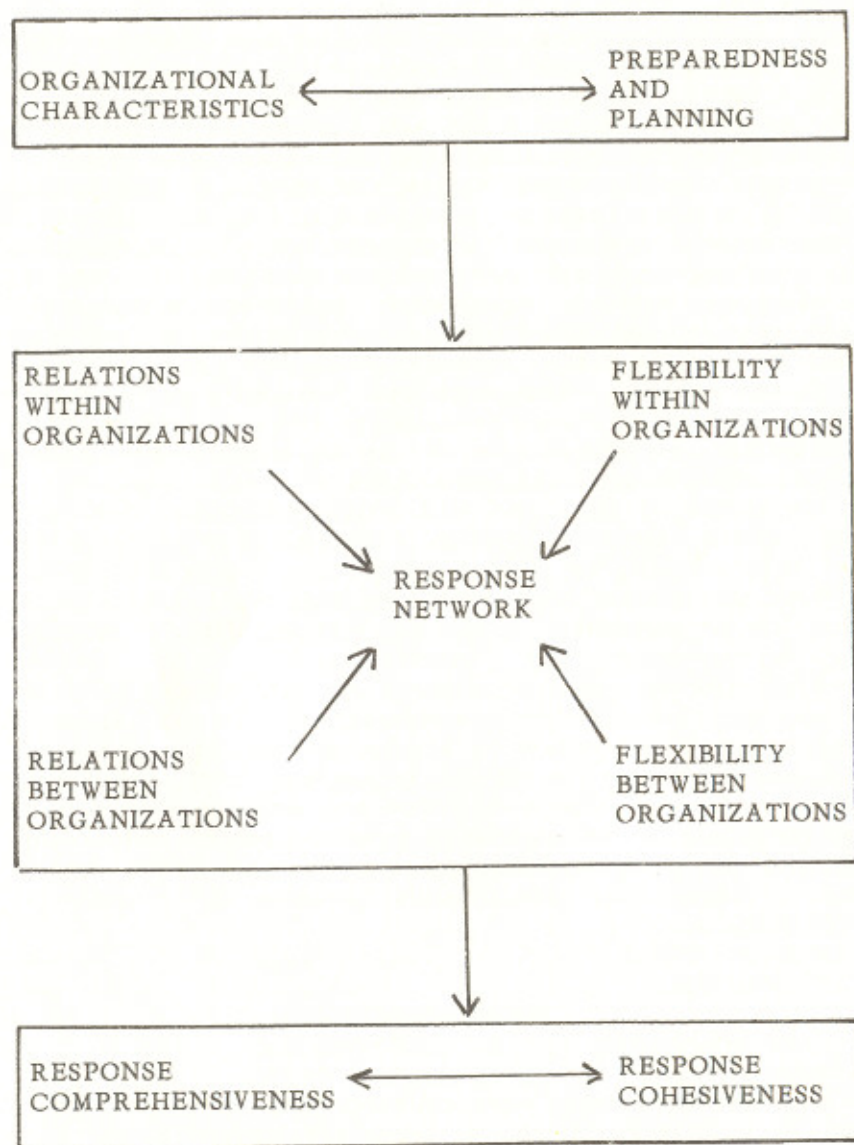


Figure 1: A General Framework for Effective Emergency Organizational Response.

exercise scheduled during the time frame of the intended data collection.

A total of twelve organizations were included in the study. These included the utility, five state agencies and six local agencies. At the state level, the organizations included the agency for emergency response, health, law, human services, and transportation. At the local level the organizations included two civil defense offices, three law enforcement agencies and a voluntary relief group.

Development of Measures

Using the general model of organizational emergency preparedness and response (see Figure 1) and the summary of the concepts important for organizational effectiveness and coordination derived from the literature review (see Table 1), it was possible to define a set of operational measures of organizational cohesiveness. These measures are based on behavior and cognitive values related to specific expressed organizational procedures and actions. A summary of these operational measures and the value associated with cohesiveness is given in Table 2.

The operational measures and related values associated with cohesiveness given in Table 2 were structured into open-ended questions to serve as discussion topics for personal interviews with representatives of all major emergency organizations involved in an emergency. The topics were used to focus discussions and elicit information from organizational/representatives on each of these measures.

Data Collection

Following the discussions with organization representatives, project staff reviewed field notes on responses to discussion topics associated with each measure of cohesiveness. These were coded as representing a cohesive value, uncohesive value, or neutral. These were arrived at by subjectively deciding whether the response were indicative of the values in Table 2. More refined ratings were felt to be infeasible given the subjective approach and choice of open-ended questions. A researcher not involved in the initial coding reviewed the codings to assure consistency in the classification. When a difference in opinion occurred, the coders jointly reviewed field notes to reach a consensus opinion. These codings were used to create profiles on each organization in the response system. Data were collected at two points or frames of reference. First, organizations were interviewed in a planning mode, and data was collected about cohesion in planning. Second, organizations were interviewed

Table 2: Measures Used to Evaluate Cohesiveness

Measures	Values Associated with Cohesiveness
Organizational Relations	
Role definition	Clearly defined responsibilities
Authority	Clearly defined powers and authority hierarchy
Territory	Clearly limited boundaries of authority
Priority setting	Understood mechanisms for setting priorities
Normativeness	Similarity between normal and emergency responsibilities
Legitimacy	Responsibilities are viewed as significant
Communications ability	Ease and clarity of access and information
Knowledge	Level of understanding about responsibilities
Intra- and Inter-Organizational Flexibility	
Formalization	Ability to deviate from written procedures
Adaptability	Ability to respond to new situations
Control	Ability to exercise and retain authority
Interorganizational Network	
Domain	Clearly defined division of responsibility
Dispute resolution	Mechanism for negotiating differences
Legitimacy of roles	Acceptance by other organizations
Resource adequacy	Sufficient resources to perform role
Autonomy	Ability to relinquish for good of system
Communications ability	High level of linkages between organizations
Authority	Network hierarchies are clearly established
Interaction clarity	Organizations know who to interact with
Knowledge	Functioning of the system is understood

in a response mode (following a test exercise during a simulated emergency), and data were collected on the same measures. The ratings from both sets of interviews were arranged in matrices so that patterns of cohesiveness in and between organizations could be reviewed. Data are summarized for both planning and response in Table 3.

Findings

Planning Mode

Intraorganizational Relations. Overall the emergency organizations and the response system as a whole demonstrated a high degree of internal cohesiveness. This means that organizations by themselves possess characteristics which will make them effective in an emergency. Most had clearly defined roles in an emergency that were clearly understood. Second, it was clear who was in command in all but one case. Third, division of responsibilities among personnel within the organizations was well understood. Fourth, organizations had mechanisms for setting or knowledge of priorities in emergency response. Eight organizations had emergency responsibilities which are similar to the normal duties. Sixth, all demonstrated a sense of importance in their emergency response roles. Seventh, communications within the organizations was at least adequate in all but one case. Finally, most organizations exhibited a good sense of knowledge about their emergency roles.

Flexibility. The systems demonstrated a high level of flexibility, that is, the ability to respond to contingencies and unanticipated situations. Only one organization had somewhat formalized procedures that would constrain flexibility. Most showed some degree of adaptability. Finally, the organizations exhibited control over their functioning in an emergency which allows for changing internal priorities.

Interorganizational Network. The cohesiveness of the system as a whole was adequate but not as well integrated as for individual organizations. The domain or the way in which responsibilities of organizations were specified were fairly well established. Few, however, had mechanisms established for resolving any disputes or conflicts that might occur. Most felt accepted as an important part of the network. Resources to carry out emergency functions were identified as a potential problem area for some. One of the weaker areas concerned communications ability, where a lack of adequate linkages and hardware emerged as the dominant problems. Another problem area concerned clarity of interaction. Many organizations did

Table 3: Data on Organizational Cohesion Case Study*

Organizational Cohesiveness Factors	Utility	Organization									
		State					Local				
		A	B	C	D	E	A	B	C	D	E

Intra-Organizational Relationships												
Role definition	C	C	U	C	C	C	C	C	U	C	C	U
Authority	C	C	U	C	C	C	C	C	C	C	C	C
Territory	C	C	U	C	C	C	C	C	C	C	C	N
Priority setting	C	C	C	C	C	C	C	C	C	C	C	N
Normativeness	N	C	C	U	C	N	C	C	C	C	C	C
Legitimacy	C	C	C	C	C	C	C	C	C	C	C	C
Communications ability	C	C	C	U	N	C	C	C	C	C	C	N
Knowledge	C	C	C	U	N	C	N	C	C	C	C	N
Flexibility												
Formalization	N	C	C	C	C	C	C	C	C	C	C	C
Adaptability	C	C	C	C	C	N	N	C	C	C	C	C
Control	C	C	N	C	C	C	C	C	C	C	C	N
Inter-Organizational Response Network												
Domain	C	N	U	C	C	C	C	C	C	C	C	N
Dispute resolution	U	?	C	U	?	?	N	N	C	U	U	N
Legitimacy of roles	C	C	N	C	C	C	C	C	C	C	C	C
Resource adequacy	C	N	C	U	C	C	N	N	C	N	C	C
Autonomy	C	U	C	N	C	C	C	N	C	C	C	C
Communications ability	N	C	C	U	N	C	C	C	U	U	U	C
Authority	C	C	N	N	C	C	C	N	C	C	C	N
Interaction clarity	N	C	C	N	C	C	N	C	U	U	U	U
Knowledge	C	C	C	N	N	C	N	N	N	N	C	U

* In this table, C = cohesive value, U = uncohesive value, N = neutral value, and ? = inadequate data.

Table 3 (continued): Test Exercise*

Organizational Cohesiveness Factors	Utility	Organization									
		State			Local						
		A	B	C	A	B	C	D	E		
Intra-Organizational Relationships											
Role definition	C	C	N	C	C	C	C	C	C		
Authority	C	C	U	C	C	C	C	C	C		
Territory	C	C	C	C	C	C	C	C	C		
Priority setting	C	C	C	C	C	C	C	C	C		
Normativeness	C	C	C	C	C	C	C	C	C		
Legitimacy	C	C	C	C	C	C	C	C	C		
Communications ability	C	U	U	N	U	C	C	C	C		
Knowledge	C	C	N	C	C	C	C	C	C		
Flexibility											
Formalization	U	C	C	C	C	C	C	C	C		
Adaptability	C	C	C	C	C	C	C	C	C		
Control	C	C	C	N	N	C	C	C	C		
Inter-Organizational Response Network											
Domain	C	N	N	C	C	C	C	C	C		
Dispute resolution	U	?	U	N	?	?	?	N	U		
Legitimacy of roles	C	C	U	C	C	C	C	C	U		
Resource adequacy	N	N	C	N	N	U	C	C	N		
Autonomy	N	C	C	C	C	N	C	C	N		
Communications ability	U	U	U	N	U	N	U	U	U		
Authority	C	C	U	C	C	N	C	C	C		
Interaction clarity	U	U	U	C	U	U	U	U	U		
Knowledge	C	C	N	C	N	C	C	C	N		

* C = cohesive value, U = uncohesive value, N = neutral value, and ? = inadequate data.

not demonstrate a good sense of knowing with whom they would be working in an emergency as was the case for their knowledge of the functions of other organizations. The response network showed fairly clear line of authority.

Response Mode

Differences in cohesiveness between planning and exercise response reflected the general patterns emphasized in the planning mode. Organizations, in general, displayed greater internal cohesion, similar levels of flexibility, and poorer cohesion between organizations.

Intraorganizational Relations. Organizations demonstrated improved cohesiveness in the exercise from what was observed in the case study. Responsibilities were better defined and people within organizations had a clearer definition of roles and an improved sense of legitimacy. Communications, identified as a potential problem in the case study, was even a greater problem in the exercise.

Flexibility. As was the case in the case study, organizations demonstrated adequate flexibility. Overall, ability to respond to new situations proved higher, although ability to deviate from written procedures decreased slightly.

Interorganizational Network. Problems identified in the case study were exacerbated in the exercise. Factors that did not pose problems in case studies either remained adequate or rated more effective in the exercise.

Across organizations three factors proved extremely problematic. First, interorganizational communications constrained effective interaction. This was heightened by a lack of interaction clarity and any observable means of solving differences. In addition, the exercise revealed some problems of legitimacy among organizations that were not evident in the case study.

On the other hand, the exercise showed an increased level of knowledge about what other organizations do than was measured in the case study. Furthermore division of responsibilities remained adequately defined. This suggests organizations are adequately prepared, know what to do, but have some difficulties in coordinating those efforts with others in the emergency response system.

Conclusions

This research sought to assemble and assess the factors that effect a cohesive and effective response both within and between

organizations to emergencies. Although the data assembled were specific only to preparedness and exercises for nuclear power plant emergencies, the practical, methodological and theoretical conclusions of this effort may well have greater generalization to other emergency types, as well as to research strategies and theory in general.

It was found, in general, that preparedness did elicit the intraorganizational cohesive properties necessary for an effective emergency response. Cohesion, as defined by the multiple indicators in Table 2 and as scored by the coders in Table 3, however, did tend to diminish in regard to relations across organizations in emergency interorganizational response networks. For example, responses of state organizations prior to the exercise indicated a clear knowledge of interaction and communications. During the exercise, however, that knowledge was not always implemented. Organizations, for the most part, demonstrated flexibility in their emergency response systems which helped increase emergency response effectiveness.

The study of organizations in planning modes attempted to measure and assess the presence of factors that helped promote cohesive response efforts both within and between organizations. We found that internally (intraorganizational) organizations have quite cohesive properties. Cohesion tends to break down, however, in relations across organizational response networks. Organizations demonstrated flexibility in their response systems which will help increase the effectiveness of response. Specific conclusions about the local, state, and utility organizations involved in this study include the following:

(1) The major barrier to effective interface among organizations is communication ability and hardware.

(2) Response cohesiveness is constrained, in addition, by uncertainty over whom should be communicating with whom, and by lack of knowledge within an organization about the roles of other organizations.

(3) Response organizations showed some variability in their overall levels of cohesion as measured by the research. Key organizations (e.g., the utility which operates the nuclear power plant), however, rated high on an index of cohesiveness.

(4) Local organizations have the weakest interface with the utility and must rely on the state for information and guidance.

(5) Individual personalities within organizations play a strong role in facilitating or preventing interaction in the planning process. This will vary from site to site and with changes in personnel within organizations.

The exercise was used to determine how cohesiveness may change during a simulated response. Overall, we found that

the observed response was not as well coordinated as the planned response. This was mainly due to problems in implementing procedures and not from having inadequate plans and procedures. In addition, we found that internal cohesiveness increased during the exercise but interorganizational cohesiveness decreased. Specific findings include the following:

(1) Communications difficulties created the major problems in achieving effective interface. This was exacerbated by confusion over the proper lines and contents of communications. Furthermore, communications were constrained by the pursuit of non-emergency response goals.

(2) Legitimacy posed an interface problem for some organizations. Attitudes of the utility operating the power plant towards off-site organizations with respect to their technical ability and resources was a constraint to interaction. Furthermore, off-site organizations did not fully trust utility personnel regarding communications about plant status and protective action recommendations.

(3) Poor implementation of the off-site notification procedure created problems, but the procedure is sound in principle.

In this research we attempted to develop a systematic approach to measure organizational cohesiveness in emergency organizations in both planning and response modes and to test our operational measures in an analysis of a radiological emergency response system. While the analysis provides substantial insight into the emergency response systems studied, several problems and steps warrant attention. First, further application of the method is required to establish measure validity and reliability. Based on the single application, it is impossible to establish whether cohesiveness was adequately measured. Furthermore, it is not known whether the measures would hold for emergency response systems for other nuclear power plants or for other hazards. A move toward a more standard and sophisticated metric would allow more precise comparisons between planning and response modes and between response systems. As we improved our understanding of the relationships among organizational characteristics, planning activities, and emergency response, the ability to develop more effective hazard planning guidelines will be greatly improved.

This research effort, which sought to explore the overlays among organizational theory, organizational planning for emergencies, and organizational emergency response also suggests four conclusions regarding these areas. First, application of this technique lends increased validity to the emerging theory of organizational behavior in emergencies. The organizational concepts suggested by theory--which we sought to operationalize

and measure to study organizational effectiveness and cohesion--did a remarkable job of explaining variations observed in the performance of emergency planning organizations. For example, the concepts of legitimacy (Dynes, 1969; Stallings, 1978; Warheit, 1970) and interaction clarity (Quarantelli, 1970; Dynes, 1969) both helped to account for observed communication patterns and constraints. Additionally, the concepts of domain consensus and resource availability helped explain how organizations perceived weaknesses in emergency planning for an accident.

Second, our systemization of factors within the theory of organizational behavior in emergencies, as well as the observations of interactions we were able to make, revealed needed areas of theoretical expansion and conceptualization. The theory of organizational behavior in emergencies is currently in need of the inclusion of two additional determinants of behavior already established in general organizational theory as key determinants. These concepts are organizational goals and actor personality. Although the development and critique of the goals concept in complex organizations is well established (Gillespie and Mileti, 1979; Haas and Drabek, 1973), the inclusion of the goals concept of prediction of organizational behavior in emergencies seemed evident and necessary. For example, our observations of behavior indicated that the goal of power dominance was sought by several organizations throughout the exercise above and beyond exercise-related goals of emergency response. Therefore, an adequate theory to explain organizational behavior in emergencies must include the multiplicity of goal-oriented processes that can drive behavior in an emergency.

Additionally, we found that the concept of personality played a key role in affecting the behavior of organizational actions in the exercise and consequently shaped the behavior of organizations. For example, one of the emergency response organizations was virtually excluded from carrying out its responsibilities because of the shy demeanor of the director of that organizational actors found in the human relations approach to the study of organizations should be included in the study of organizational response to emergencies.

Third, the theory of organizational behavior in emergencies well incorporates and underscores the importance of the interorganizational relations and the network perspective in explaining emergency response of organizations. Exemplary concepts such as domain consensus and legitimacy between organizations, the division of tasks and functions between organization and other similar concepts are not only theoretically important, but are also empirically demonstrated. Their empirical demonstration with respect to emergency planning, however,

has only been minimally recorded. The bulk of work in the empirical study of emergency planning has been conducted from an intraorganizational perspective. Given the demonstrated theoretical importance of interorganizational and network factors for explaining organizational behavior in general theory and the lack of empirical studies documenting these factors in settings of pre-emergency planning behavior, it seems obvious that more empirical work is needed to demonstrate and test their applicability.

Finally, the determinants of planning for and actual behavior in emergencies documented in this paper must themselves be explained by a broader theory of organizations. That is, the theoretical determinants in the theory discussed here should be recast as consequences or outcomes and their determinants theoretically specified and empirically demonstrated. For example, it is not just important to demonstrate that legitimacy is a determinant of organizational behavior, but it is also important to understand how legitimacy is shaped and why it varies among emergency planning organizations. Initial causes of factors like legitimacy are documented in general organizational theory (Rogers and Whetten, 1982; Van de Veb, 1976; Thompson, 1967). These causes must be brought into emergency organizational theory and then empirically demonstrated.

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